

Study of solar cycle variation and its impact on critical frequency of F2 layer

* P. K. Purohit¹ and Roshni Atulkar¹

¹*National Institute of Technical Teachers' Training and Research, Bhopal – 462002, MP, India.*

The period of approximately 11 year cycle of solar activity is characterized by the rise and fall in the numbers and surface area of sunspots. We observed a number of other solar activity indices, including the 10.7 cm radio flux, solar Mg II core to wing ratio, relative sunspot number R_z and solar flare index geomagnetic activity that vary in association with the sunspots for solar cycles 23 (1996–2008). This paper presents an analysis of the F-region variability of the ionospheric F2 layer critical frequency (f_oF_2) at Australian mid latitude ionosonde station, Hobart (42.88° S and 147.32° E) during the period 1996 – 2008 of solar cycle 23. The diurnal, monthly, and yearly characteristics of ionospheric F-region parameter f_oF_2 have been studied in detail. We also compared the dependence of f_oF_2 on solar activity indices by using a correlation analysis, and showed a significant linear relationship between the f_oF_2 values and Solar indices. The f_oF_2 variation is strongly influenced by solar activity with about an 11-year solar cycle from the solar maximum to solar minimum.

Table 1. Correlation of f_oF_2 with solar indices during different phases of solar cycle 23.

Geomagnetic Indices Vs Fof2	Correlation
Flare Index-foF2	0.85
R_z -foF2	0.92
F10.7-foF2	0.93
Mg II c/w-foF2	0.88

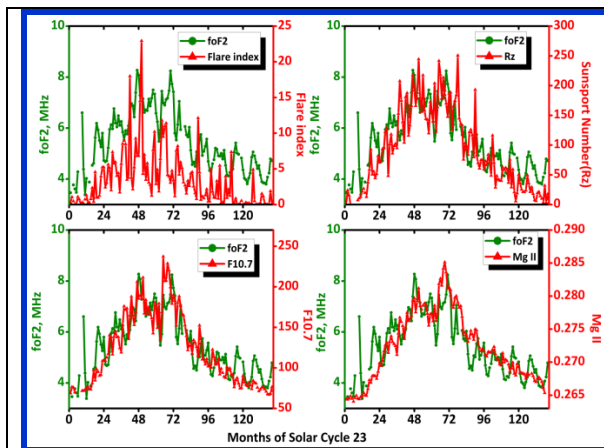
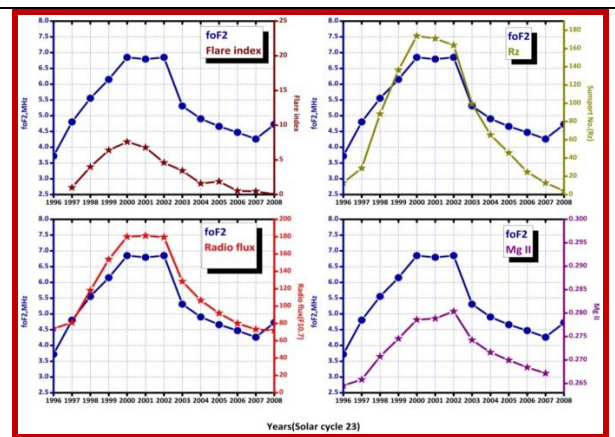


Figure – 1: Monthly variation of solar indices with critical frequency foF2 during Solar Cycle 23.



Figure–2: Annual variation of solar indices with critical frequency foF2 during Solar Cycle 23.

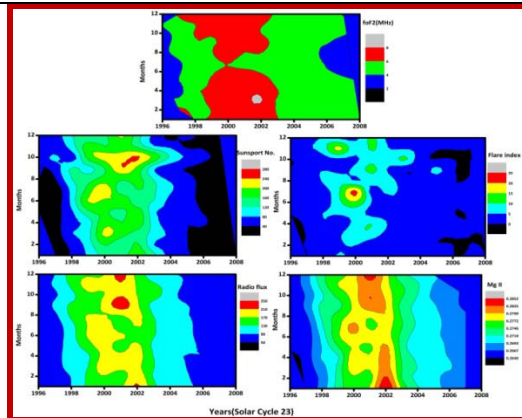


Figure-3: Behavior of critical frequency foF2 and solar indices during the solar cycle 23.

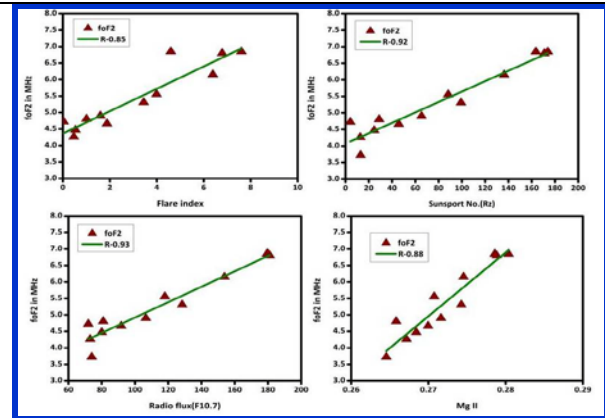


Figure – 4: Scatter and Correlation of foF2 with Flare index, sunspot number (Rz), Radio flux (F10.7) and Mg II core to wing ratio during the solar cycle 23.

References

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